Donna Wieting, Chief
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Office of Protected Resources
National Marine Fisheries Service
1315 East-West Highway
Silver Spring, MD 20910-3226

RE: Request by the U.S. Navy for a Letter of Authorization for taking marine mammals by harassment incidental to Navy operations of the SURTASS LFA Sonar.

Dear Dr. Wieting,

I have reviewed the Final OEIS/EIS (January, 2001) for the SURTASS LFA sonar prepared by the U.S. Navy, the draft OEIS/EIS (August, 1999), the submitted comments on the draft OEIS/EIS, and the submitted comments on the ANPR published by NMFS (total weight = 4 kg). My concerns echo many of those voiced by other scientists in these documents. In particular, I concur with the evaluations of the draft OEIS/EIS provided by acoustician Dr. John Potter (E-106), and those of biologist Dr. Hal Whitehead (O-021). The Final OEIS/EIS addresses most of these concerns by arguing against them. This is an unsatisfactory response to reasonable concerns.

Because it appears that the U.S. Navy has decided to assume that the impact of the proposed LFA sonar systems on ensonified organisms will be "negligible" until they see physical evidence to the contrary, I will focus my comments on the currently proposed techniques for monitoring and reporting the potential impacts of these sonar systems. I will also briefly comment on some possible techniques for mitigation that are not discussed in the Final OEIS/EIS.

I have five years experience in ocean acoustics and eight years experience in marine mammal acoustics. My doctoral dissertation (Mercado, 1998) focused on how humpback whales use sound in the ocean, including analyses of how frequencies in the range produced by SURTASS LFA sonar propagate in waters frequented by humpback whales (Mercado & Frazer, 1999; see also Mercado et al., 2000). I also have spent several years conducting scientific studies of learning and memory abilities in cetaceans, and studying the effects of experience on auditory cortical processing in mammals.

Monitoring of Impacts

The rules proposed in the Federal Register (vol. 66, no. 53) state, "NMFS will adopt only the geographic mitigation as being effective in reducing takes." The geographic restrictions proposed by the Navy that are relevant to preventing injury to marine animals impose sound field limits 22 km or less from coastlines and biologically important zones (Sections 2.3.2.1 and 5.1 in the Final OEIS/EIS). These restrictions do not take into account the locations of marine mammals relative to a LFA sonar system. The proposed methods for "monitoring to prevent injury" are not based on geography, but rather on the detection of animals that would be exposed to levels greater than 180 dB during operation of the sonar. A major weakness of the currently proposed rules is that they do not provide any way to reliably assess (1) how many takes occur when an LFA sonar is in use, (2) what short-term and long-term effects (if any) LFA sonar

signals have on undetected (and detected) animals, and (3) how well operators are estimating the extent of the 180 dB sound field.

The Navy proposes to assess the efficacy of mitigation measures, but the only assessment noted in the Final OEIS/EIS is monitoring of marine mammal stranding incidents. In a response to requests for elaboration on how impacts will be assessed (Comment 2-4.9, p. 10-61) the Navy states that, "Only counts of animals detected within the 180-dB mitigation zone will be reported". Such minimal information will not allow NMFS to determine how many takes occur. At a minimum, information concerning when, where, and how animals are detected should be reported. Ideally, a running record of events (including possible detections) occurring before, during, and after the beginning of LFAS deployment would be made available. Environmental signals recorded as part of the passive and active monitoring of underwater sounds should be saved for later analysis; this way if certain species consistently escape detection, researchers can perform post-hoc analyses of recordings to try and determine why this is the case, and how such problems might be solved.

Recordings from the passive array can potentially be used to assess effects on animals outside of the 180-dB border. For example, the number of animals vocalizing 50 km or less from the LFA source could be measured before, during, and after deployment, to see if operation of the LFA influences vocalization rates within this range.

Recordings from the HF/M3 sonar could be used to determine whether detected animals are more likely to approach, avoid, or ignore LFA broadcasts, by comparing animals' positions before and after such broadcasts. This approach is particularly applicable to baleen whales, that, because of their size, should be detectable at much longer ranges than toothed whales (and which the Navy acknowledges are the animals most likely to be adversely affected by LFA broadcasts). The Navy could also potentially use the LFA sonar to monitor the positions of baleen whales during operations. Echo signatures from large whales could be determined by comparing detections made with the HF/M3 sonar with returns from the LFA signals (i.e., if returns are generated from the same spatial location, they most likely are generated by the same target).

Collection of these types of records does not require an unreasonable amount of effort by the U.S. Navy. Signals from hydrophone arrays can be recorded and stored automatically. Audio records of visual observation sessions are standard practice. If the information in these records is deemed to be too "sensitive" to be made available to the general public for security reasons, then perhaps a few trustworthy individuals at NMFS with expertise in signal analysis could be given clearance to analyze the records.

Mitigation for Baleen Whales

Although the Navy proposes to use acoustic modeling to determine geographical restrictions, the specific modeling to be used to determine the maximum range at which levels of 180 dB could be received is unclear. Statements in the main text of the Final OEIS/EIS seem to suggest that environment-specific calculations will be performed (using parabolic equation models) to determine zones of mitigation. However, the response to Comment 2-1.4 (p. 10-48) explicitly states that "The model, or calculation, used to define the 180-dB sound field is the standard spherical spreading algorithm (20 log R, where R = range in meters)". This model is purely geometric and does not take into account environmental features such as sound channels and bottom features that can greatly affect how far LFA sonar signals will propagate. If such factors

are not taken into account, it is highly doubtful that the estimated extent of the 180-dB limited sound field will be accurate.

If NMFS plans to accept geographic restrictions as a valid mitigation measure, then they should consider installing hydrophone arrays at strategic (and undisclosed) locations at the borders of mitigation zones, equipped with monitoring systems that record all acoustic events exceeding 160 dB. Additionally, such systems could potentially be used to automatically detect and localize LFA sonar sources, to verify that received levels are as low as the Navy estimates they will be. Some measures should also be taken around the LFA source to assess whether the extent of the 180-dB sound field is consistent with predictions. For example, sono-buoys might be dropped just before the LFA sonar is deployed and monitored as the broadcasting ship moves away from them. The Navy's response to this issue (Comment 2-4.8) was, "These models have been subjected to a long and complex validation and verification process, and no additional monitoring of the sound field is required." Conversely, given that the Navy is so confident in their estimates of transmission loss, they should be happy to spend a few thousand dollars to provide NMFS with monitoring systems so that NMFS officials can see for themselves how accurate the Navy's calculations are.

The U.S. Navy feels baleen whales will not mind listening to the 179 dB signals generated by LFA sonar systems; whether baleen whales will agree remains an open question. Large whales should be given some chance, however, to clear the area if they do mind. In the current proposal, the LFA signal is produced at full power with no warning. The Navy suggests that ramping up the signal might alert targets, and is not necessary because of their monitoring procedures for areas within the 180-dB contour. There are alternative ways in which whales could be warned. If the Navy repetitively broadcasts a distinctive, unnatural, relatively broadband/ low-Hz signal (e.g., a time-reversed orca call) at levels loud enough that the sounds can plausibly be detected by baleen whales 5-10 km away from the ship (or whatever range would be comparable to the range the HF/M3 signal will be detectable by toothed whales), then whales could potentially learn that this sound predicts the onset of LFAS. How many times an individual animal might be exposed to LFA signals in a lifetime is unclear. What is clear is that in the current scenario, there is nothing to warn baleen whales that they are about to be exposed to an unnaturally loud sound, and nothing that would allow them to predict when such an event might occur. Broadcasting a "warning" signal that travels several kilometers would not provide any cues to potential enemies that use of the HF/M3 (or the sounds generated by the ship carrying the LFAS projector) would not already provide.

Collection of Relevant Data

In tests of the HF/M3 sonar described in the Navy's Final OEIS/EIS, bottlenosed dolphins whose movements were directed by the experimenters, and whose dive paths spanned the entire water column, remained undetectable (9 of 20 were not detected) even at ranges as short as 400 m (Final OEIS/EIS p. 2-19,2-20). These data suggest that a substantial number of marine mammals will have the opportunity to experience firsthand the full capabilities of an LFAS.

The concurrent use of passive monitoring, active high-frequency scanning, and active low-frequency scanning can provide unique opportunities for collecting important information about

how sounds reflect from different marine species. This information can potentially be used to increase the effectiveness of monitoring strategies, thereby decreasing the number of animals that have to experience an LFA up close because they were not detected.

What Kind of Take would it Take?

The Navy's discussion of past incidents in which use of man-made sonar is suspected of leading to the deaths of several cetaceans (Final OEIS/EIS p. 3.2-45 thru 3.2-47), suggests that evidence showing that whales can be injured by a mid-frequency (3 to 5 kHz) sonar is not relevant to the proposed deployment of LFA sonar systems. Comparable logic would suggest that evidence showing that bullets from revolvers can kill people is not relevant to considering whether cannons should be used in a parade. It would perhaps be more honest for the Navy to just admit that they value national security more than the security of marine animals. It is a given that military actions (and preparations for those actions) will harm animals. The goal of the Navy and NMFS should be to minimize the damage as much as possible, and to collect data that will allow them (and others) to assess what damage is done as well as how such damage might be avoided in the future.

Sincerely,

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References

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